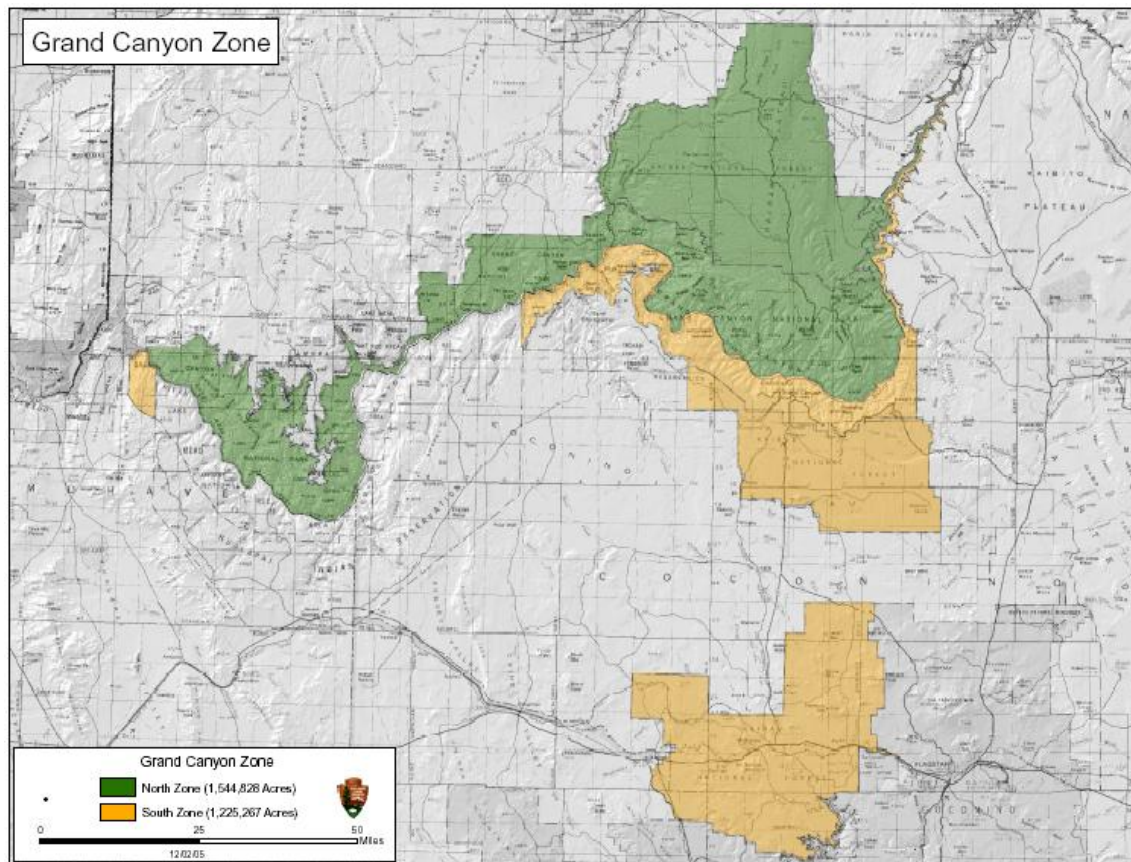


# **Grand Canyon National Park & Kaibab National Forest**

## **National Fire Danger Rating System**

### **2009 Operating Plan**



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Forest Fire Staff Officer - Kaibab National Forest

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Fire Management Officer - Grand Canyon National Park

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## I. Introduction

The National Fire Danger Rating System (NFDRS) is being used to support the fire management decision making process within the Grand Canyon National Park and the Kaibab National Forest. Fire-danger ratings are guides for initiating preparedness activities and selecting the appropriate level of initial response to a reported fire. The purpose of this Interagency Fire Danger Operating Plan is to analyze and develop danger rating areas to manage the NFDRS for both agencies. Just as agency administrative boundaries are not delineated on the basis of climate, fuels, or topography, neither is fire occurrence and fire danger. A combined NFDRS operating plan will maximize the efficiency and effectiveness of the agencies respective fire management organizations. The plan was developed to assist with planning and operational decisions relative to fire danger, preparedness, resource needs, personnel briefing, situational awareness, and implementing fire restrictions.

This operating plan is a tool that will assist fire managers in understanding and utilizing fire-danger information in the day-to-day management decisions and in long term fire preparedness planning. It is a framework for a consistent thought process to apply fire-danger rating within the jurisdictions of the Kaibab National Forest and the Grand Canyon National Park.

This plan was developed through analysis of fuels, weather, and topography. A matrix (Exhibit 1, Fire Danger Technical Group) was developed to analyze the problems that exist, the target groups that will be impacted, and the fire-danger rating component or index that could be used to assist in making decisions to reduce the problems. The analysis does not take into account other factors such as resource drawdown, training levels, political factors, overriding budget constraints and other external factors.

The role of the fire danger rating operating plan is to guide the application of the NFDRS at the unit level. It:

- Identifies the fire problems within the Grand Canyon National Park and the Kaibab National Forest.
- Defines which NFDRS indices and components best fit the fire management decision needs among the agencies.
- Defines fire-danger rating areas to which NFDRS outputs apply.
- Defines which NFDRS fuel model, slope class, and climate class that represent each fire-danger rating area.
- Designs a fire weather station network to collect the meteorological data necessary to support fire-danger rating and fire management decisions.
- Relates fire-danger and fire business to determine staffing levels, preparedness levels, preplanned dispatch levels, and fire prevention activities within the planning area.

In order to use this plan effectively, fire managers must understand the four basic principles of the NFDRS.

1. The system only relates to the potential of an initiating fire that spreads without spotting through continuous ground fuels.

2. The system only addresses those aspects of fire control strategy affected by fire occurrence and fire behavior. The system is based on the concept of containment, not extinguishments. This allows limiting the scope of the rating to the behavior potential of the head fire.
3. The ratings are relative not absolute.
4. Fire-danger is rated on a worst case basis. This important principle must be understood to properly interpret fire-danger rating.

NFDRS is not intended to predict how every fire will behave but to provide for short range planning. It indicates the average worst case burning conditions that fire managers need to be prepared for. This system will determine the average worst case burning conditions across the landscape understanding that some risk is involved because the agencies cannot afford to staff for the absolute worst case conditions. The NFDRS outputs are relative values (indices) of fire spread (spread component), flame length (burning index), and available fuel energy (energy release component) are a few that are commonly used.

## II. Roles and Responsibilities

### A. Fire Danger Technical Group

Each Participating agency will be responsible for providing an NFDRS technical specialist to participate in the maintenance, review, and update of the plan. They will provide oversight to insure coordination between the agencies is occurring. The technical group consists of the following agencies and individuals.

Agency	Technical Specialist
Williams Interagency Dispatch Center Manager	Norma Orozco
Kaibab National Forest North Zone (NKRD & NR GCP)	Edward Hiatt
Kaibab National Forest South Zone (Williams & Tusayan RDs)	Holly Kleindienst

**Exhibit 1**

### B. Williams Interagency Dispatch Center

Personnel at Williams Interagency Dispatch Center are responsible for WIMS program implementation, station catalog maintenance and the dissemination of the daily fire-danger outputs to the field. The dispatch center will communicate daily, by radio and internet these outputs.

WIMS: NFDRS components and indices are calculated using the NFDRS processor within the Weather Information Management System (WIMS). Fire-danger calculations are made daily based on a single observation taken at 1300 hours Local Standard Time (LST). These observations are averaged between the Tusayan and Greenbase weather stations for the South Zone. These observations are averaged between Dry Park and Warm Springs weather stations for the North Zone. The dispatch center is responsible for the daily monitoring and editing of inputs. Each RAWS station outputs of the current fire-

danger will be updated weekly (**Monday and Friday**). This can be accomplished with assistance from SWA Predictive services personnel.

Station Catalog Maintenance: The Center Manager is responsible for assuring that station catalog information is reviewed on a yearly basis. Only the Center Manager will have edit access to all catalogs and will adjust inputs as necessary after station analysis has been performed by the agency technical specialist.

Communication of Outputs: By 1600, the afternoon forecast package will consist of the fire weather forecast, today's fire-danger indices and the next day forecasted indices for both Zones. They will include the following:

1. ERC & BI– today's value and tomorrow's forecasted value.
2. Adjective Rating - today's value and tomorrow's forecasted value. This rating should not change on a daily basis.

Note: Preparedness Plan Level, Industrial Fire Precaution Level, Energy Release Component, and Burning Index will be available on the Kaibab National Forest Intranet site (<http://fsweb.kaibab.r3.fs.fed.us/fire/fire.html>).

### C. Field Operations Managers

Field Operation Mangers are responsible for the implementation of this plan; ensuring decisions made are consistent with the intent of the plan. Field Operation Managers will assure that their personnel understand NFDRS outputs and how to apply them to daily operations. **Yesterday's and today's forecasted indices and their implications to the day's operations will be discussed each morning by all field going personnel as a part of their "Six Minutes for Safety" briefing.**

### D. Unit Fire Program Managers

Unit Fire Program Managers (Kaibab National Forest Fire Staff Officer / Grand Canyon National Park Fire Management Officer) will utilize this Fire Danger Operating Plan and NFDRS outputs as a tool in developing appropriate decision matrices to establish appropriate fire related actions. It is the responsibility of the Unit Fire Program Manager to ensure this plan is utilized, maintained, and communicated.

## III. Fire Danger Rating Inventory

### A. The Administrative Unit

The size of the analysis area is 2,792,726 acres. There are two agencies cooperating in the administrative unit. They are Grand Canyon National Park and Kaibab National Forest. There are three fire-danger zones within the analysis area which are divided up into two zones with each having their own distinct adjective class, preparedness and industrial fire precaution levels. They will be identified as the North Zone and South Zone.

Grand Canyon NP	1,192,617
North Rim District	880,972
South Rim District	307,309

The river corridor is not included which accounts for 7,700 acres.  
A large percentage of Grand Canyon's acres are within the "inner canyon" and are usually not acres which contribute to fire-danger.

Kaibab Forest acres	1,600,109
North Kaibab Ranger District	655,897
Tusayan Ranger District	331,427
Williams Ranger District	613,595

Total analysis acres: 2,792,726

- The North Zone consists of three Fire Weather Zones (zone 104, 105 and 106) and one fire-danger zone (Zone 303).
- The South Zone consists of three fire weather zones (zone 107, 106 and 115) and two fire-danger zones (zone 302 and 303).

## B. Fire Activity

For the 13 year period used in the analysis, 1994-2009, there was an average **156** fires per year and an average of 3507 acres burned per year on the South Zone and **82** fires per year and an average of **12358** acres burned per year on the North Zone. The South Zone has a traditional fire season lasting from May 15 until mid October. The North Zone has a traditional fire season that lasts from mid-May until mid-October. Fire occurrence peaks in mid-July due to lightning activity associated with the summer monsoons. Human caused fires account for about 15% of the fire occurrence load on North Zone and 30% on South Zone (See Exhibit 2a & 2b for a summary of all fire occurrence statistics.)

### North Zone Fires

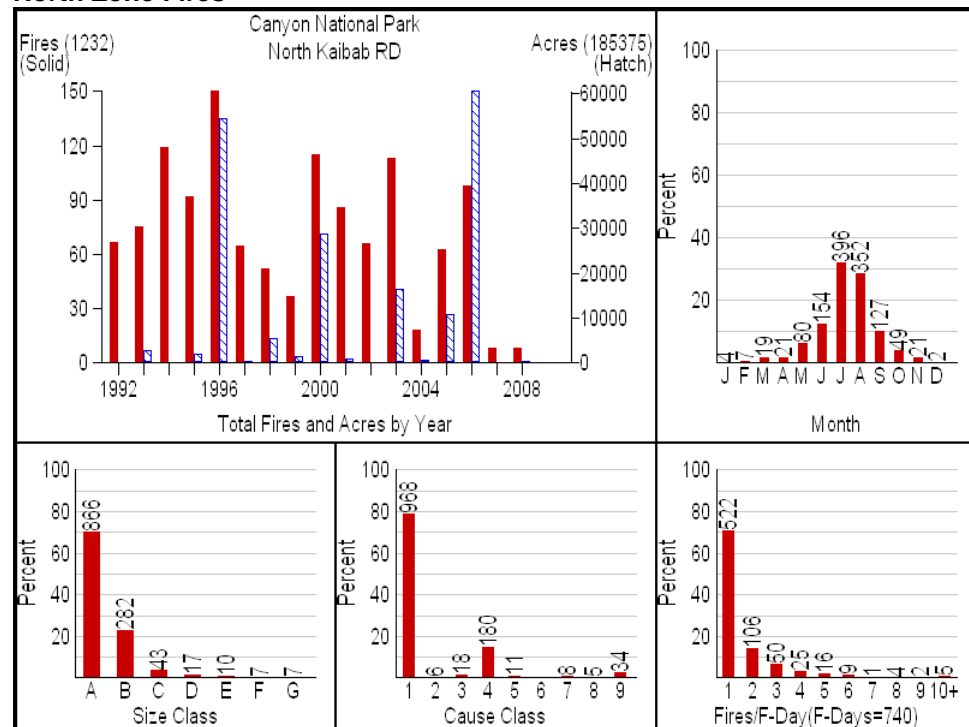


Exhibit 2a

## South Zone Fires

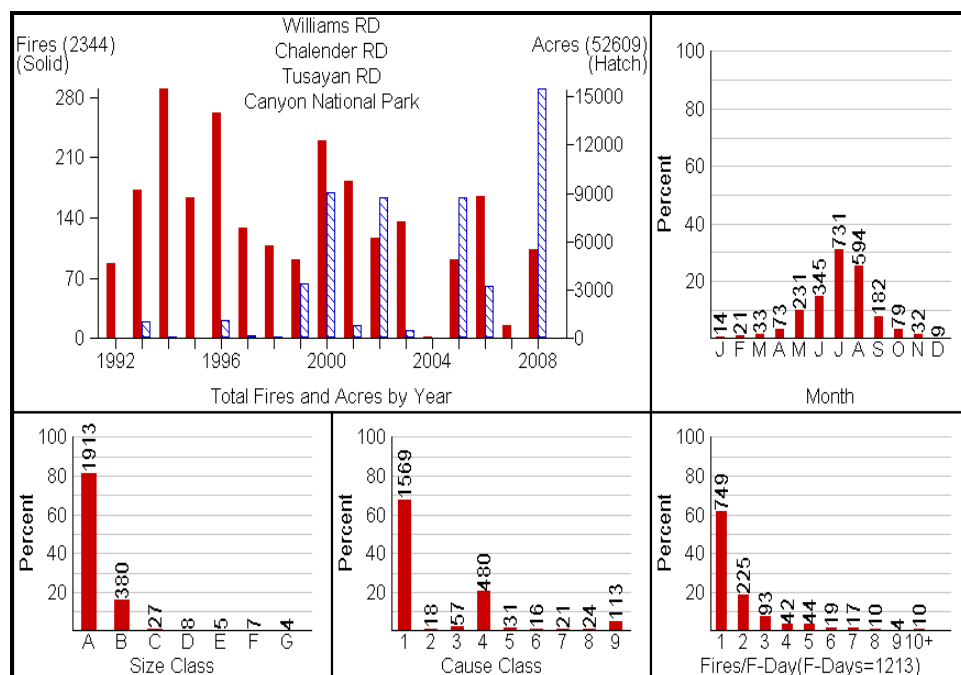


Exhibit 2b

## C. Weather Stations

The Grand Canyon NP and the Kaibab NF contains a network of six remote automatic weather stations (RAWS). Inclusion in the weather analysis depends primarily upon two criteria: 1) length of record, and 2) data consistency within the period of April to October. Each station was examined and judged upon these two criteria.

Primary weather stations within each zone will be Tusayan and Greenbase for the South Zone and Dry Park and Warm Springs for the North Zone.

## D. Vegetation and Fuels

Predominant vegetation falls into five categories: grasslands, brush, pinyon-juniper, ponderosa pine, and mixed-conifer. Low elevation fuels are grass, brush, and pinyon-juniper. High elevation fuels are pinyon-juniper transitioning into ponderosa pine and mixed-conifer.

Grasslands occur primarily at lower elevations. Many areas of grasslands occur within the Grand Canyon itself, with smaller areas occurring within both fire-danger zones.

Brush occurs throughout the area and consists primarily of sagebrush and mountain brush communities. Low elevation brush communities are sagebrush, gambel oak, cliffrose, serviceberry and mahogany. Where sagebrush grows, it is generally the dominant brush type and commonly occurs with pinyon-juniper. The mountain brush community is comprised of gambel oak, cliffrose, mountain mahogany, serviceberry, and manzanita. Manzanita and gambel oak persist throughout the ponderosa pine vegetation type. These brush communities extend across several ecosystem types and elevations.

Pinyon-juniper communities exist across the fire-danger zones. These woodlands occur with and without understory. Pinyon-juniper woodlands give way to ponderosa pine at roughly the 7500' elevation level.

Most ponderosa pine stands are fairly open with mature trees where there have been treatments. Some stands exist with white fir encroachment as you increase in elevation. Most stands have moderate dead fuel loadings. Needle litter is the primary carrier of fire in the ponderosa pine category. The mixed-conifer community begins at about 8000' and continues to the highest elevations. Mixed-conifer tends to be a closed canopy with high dead fuel loadings.

Aspen stands occur throughout ponderosa pine and mixed-conifer communities, with the largest stands located where there has been disturbance from fire, wind or logging practices. Most aspen stands are declining to the lack of disturbances.

Many large fires have occurred across these fire-danger areas significantly reducing the danger of escaped wildland fire.

The analysis for the north and south fire-danger zones are modeled with NFDRS model G.

## E. Topography

The basic consideration for selecting the slope class is the topography in the base area where initial attack is commonly taken. This is "not" the immediate vicinity of the fire weather station. Precision in estimating slope class is subjective and absolute precision is not necessary.

<u>Slope Class (SC)</u>	<u>Slope (Percent)</u>
1	0-25
2	26-40
3	41-55
4	56-75
5	+75

Fire Danger Zone:

- 303 North = SC 1
- 302 and 303 South = SC 1



## F. Climate Class

The purpose of understanding climate is to allow the processor to select the proper seasonal response of live fuel moisture predictions. Seasonal response of live fuels is dependant on latitude, elevation, and time of the year which are all a factor of climate. C.W. Thorne Waite's "The Climates of North America According to a New Classification" publication was used to determine the Climate Class for each fire-danger rating area. Both zones fit Climate Class 2 sub-humid (rainfall deficient in summer).

Adjustments of climate class are allowed during the course of the fire season if the observed live fuel characteristics deviate from the model but are not advised. Using actual measured values to manually adjust in WIMS is the preferred alternative. Only measured live fuel moisture values can be edited. All other values are to be left as calculated.

## G. Fire Danger Rating Area

Current fire-danger zones outlined in the Southwest Area Fire Weather Annual Operating Plan are sufficient for this analysis (Refer to Exhibit 3 NFDRS zone map and fire weather zone maps).

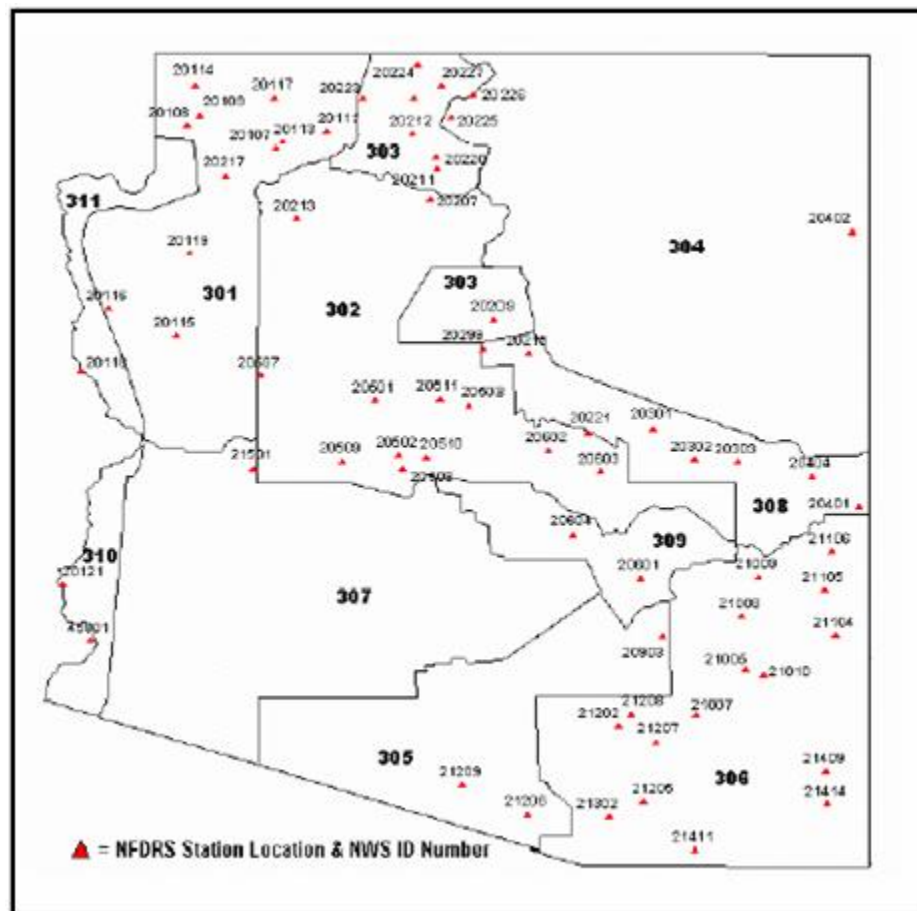


Exhibit 3

## **IV. Fire Danger Indices and Fire Business**

### **A. FIRES Correlations**

1. The fire weather history was created for 7 RAWS using a quality control process resulting in the most consistent, historic weather data available. Weather history data from 1994 – 2009 was imported into FireFamily Plus.
2. Two fire-danger zones were created using GIS tools and Data as well as obvious topographic features.
3. Fire histories of the Kaibab NF and Grand Canyon NP were obtained and imported into a Microsoft Access Database to be used in FireFamily Plus.
4. Two Individual weather stations were selected within each fire-danger zone.
5. A Special Interest Group (SIG) was created to run a FireFamily Plus probability analysis and cumulative fire analysis correlations.
6. The Cumulative Fires Analysis graphs were used to identify the best fit by looking for the best separation between Fire Days, Large Fire Days, and Multiple Fire Days using the assigned index and fuel model. The large fire day size was 10 acres and multiple fire days were 3 fires.
7. The component that generally had the best fit over the two fire-danger zones was Energy Release Component (ERC) and Fuel Model G (dense conifer with ground litter and heavy fuels).
8. Grand Canyon National Park does not have defined districts within the DOI fire reporting process. With the use of GIS and spreadsheets locally managed fire occurrence data was compared to the DOI Grand Canyon NP occurrence data to separate the north zone and the south zone fires for Grand Canyon NP. This was last done in Feb of 2009 by Edward Hiatt.

### **B. Adjective Fire-Danger Rating and Definitions**

In 1974, the Forest Service, Bureau of Land Management and state forestry organizations established a standard adjective description for five levels of fire-danger for use in public information releases and fire prevention signing. For this purpose only, fire danger is expressed using the adjective levels and color codes described below (Exhibit 4). In 2000, the NWCG Fire Danger Working Team reviewed and slightly revised these terms and definitions for adjective fire-danger.

<b>Fire Danger Rating and Color Code</b>	<b>DESCRIPTION</b>
<b>Low (L)</b> <b>(Green)</b>	Fuels do not ignite readily from small firebrands although a more intense heat source, such as lightning, may start fires in duff or punky wood. Fires in open cured grasslands may burn freely a few hours after rain, but woods fires spread slowly by creeping or smoldering, and burn in irregular fingers. There is little danger of spotting.
<b>Moderate (M)</b> <b>(Blue)</b>	Fires can start from most accidental causes but, with the exception of lightning fires in some areas, the number of starts is generally low. Fires in open cured grasslands will burn briskly and spread rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel, especially draped fuel, may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy.
<b>High (H)</b> <b>(Yellow)</b>	All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High-intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are attacked successfully while small.
<b>Very High (VH)</b> <b>(Orange)</b>	Fires start easily from all causes and, immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high intensity characteristics such as long-distance spotting and fire whirlwinds when they burn into heavier fuels.
<b>Extreme (E)</b> <b>(Red)</b>	Fires start quickly, spread furiously, and burn intensely. All fires are potentially serious. Development into high intensity burning will usually be faster and occur from smaller fires than in the very high fire danger class. Direct attack is rarely possible and may be dangerous except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions the only effective and safe control action is on the flanks until the weather changes or the fuel supply lessens.

**Exhibit 4**

Adjective Fire-Danger Rating is determined by taking the Preparedness Level and the current Ignition Component. At the point where the two connect is the Adjective Fire-Danger Rating. (Exhibit 5)

Adjective Fire Danger Rating					
Preparedness	Adjective Fire Danger				
0	0	0	0	0	0
1	L	L	L	M	M
2	L	M	M	M	H
3	M	M	H	H	VH
4	M	H	VH	VH	E
5	H	VH	VH	E	E
Ignition (IC) Component	0- 20	21- 45	46- 65	66- 80	81- 100

Fire Preparedness Levels					
	Level I	Level II	Level III	Level IV	Level V
SZ SIG ERC G	21	41	74	86	87+
NZ SIG ERC G	30	48	75	90	91+

\*Note Changed from Previous Year

Exhibit 5

### C. Pocket Cards and Development

A Pocket Card (PC) will be developed for both North and South Zones using the NFDRS Fuel Model G, and the NFDRS indices Burning Index (BI) and Energy Release Component (ERC). Burning Index is used to help with the daily fire-danger rating because it uses a wind component. Current and trending seasonal fire-danger is best explained by the Energy Release Component (ERC). Pocket Cards will be updated each year, prior to fire crews working in the field environment. A Pocket Card Poster Board (Exhibit 6) shall be displayed at each work station as an aide to Pocket Card use. It is recommended that each station have a board to track current indices. District and Zone FMOs will have input into the Pocket Cards unique items pertaining to each zone prior to printing.



FireFamilyPlus 4 (FF+) and Microsoft PAINT were used to create the 2009 Pocket Cards. Pocket Cards developed strictly through FF+ cannot display two indices on one card. By using Microsoft Paint and FF+ together, a combination PC can be created which displays BI and ERC, simplifying use in the field. A Pocket Card Example using dual indices is shown in Exhibit 7.

## Pocket Card Poster Board Example

### Fire Danger Pocket Card

#### Kaibab National Forest

#### Grand Canyon National Park

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#### What Is It?

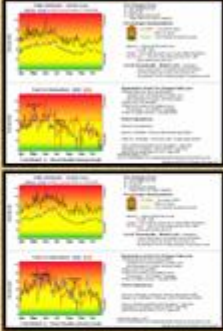
A method to communicate information on fire danger to firefighters. An aid to firefighters. Provides a method to communicate a common understanding of fire index values of the National Fire Danger Rating System (NFDRS). Provides a description of seasonal changes in fire danger in a local area. A way to make general assessments of fire potential based on local weather conditions and historical fire occurrence.

**REMEMBER!!** Weather stations used to calculate NFDRS indices apply the most recent season potential for the representative area and that NFDRS indices and temperature related general conditions and DO NOT predict fire behavior for a specific area.

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#### What Type of Information will you find?

- Trend and status of this year's fire season - Comparison of current conditions to past years
- Fire danger values related to past seasons - Historical and long range information
- Upper left quadrant shows the historical trend and average seasonal trends for the representative fire danger index. Burning Index (BI) is being used to estimate local fire activity. BI is related to the available energy within the burning forest at the head of a fire and it is often a good indicator of fire potential and shows seasonal trends in drought conditions. BI is related to the earlier indices of fire activity in the effort of establishing a fire. BI is related to flame length in feet by dividing the BI index value by 10 you get an approximate representation of the flame length expected for the fuel model it is representing. The dashed line represents the 100° Fahrenheit BI for the area.
- Lower left quadrant shows the seasonal trend for BI. Some highly significant changes for the Fire Danger Index as well as locally significant fires.
- Upper right quadrant identifies the representative fire weather forecast area, weather data sources, explanations of the maximum and average trends, length of weather records used, and local threshold values and conditions that "Shout 'Watch Out!'".
- Lower right quadrant has information related to enhancing your understanding of the selected seasonal trend graphs, definitions and explains into the index plotted, data is on a regular basis starting in the years and fire period, and information regarding the data data. Details the fire danger index values that less the fire started, and conditions to be aware of that lead to serious fire activity.



Fire Danger Index Cards for the North and South Sides

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#### How Can It Help You?

The goal of the Fire Danger Index Card is to increase firefighter safety by enhancing your awareness of local conditions and fire potential. The following are the ways the Fire Danger Index Card can assist you:

- It provides an indication of fire danger rating for the local situation. By plotting the current seasonal trend against the average and extreme trends, you can see how the fire season is progressing.
- It provides a supplement to experience. Day to day seasonal trend values are based on historical weather and as such, when events which significantly deviate from the norm and individual fire the Fire Danger Index Card may serve to suggest your memory of significant fire events, fire seasons, and local fire seasons. In addition, for non-firefighters or out of area resources it provides a reference to previous active fire seasons for reference.

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#### How To Use It

- The Fire Danger Index Card is used for daily area briefing, briefing for incoming crews, and of area safety resources, and informal updates of past seasonal trend graphs.
- When the morning and afternoon weather forecast, observed and predicted indices are announced, firefighters can reference the representative Fire Danger Index Card to see how local conditions in the past change of fire danger rating in how you are in the fire season, and to select the latest relevant seasonal trend.
- By comparing the daily values of fire danger indices to the seasonal trend as shown on the Fire Danger Index Card, the firefighter can track the current seasonal trend, plot the season's daily index values, and quickly gauge the potential effect of the day's fire danger season effect.

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#### Additional Information

For general information concerning the above Fire Danger Index Card for the Kaibab National Forest and Grand Canyon National Park contact:

Forest Service, Center Manager (928.633.3236)

William Stephens

William, J.E.

For additional information concerning public use for development of Index Cards, instructions for creating Index Cards, public use concerning Index Cards, and the posting of Index Cards from other geographic areas and agencies go to the following website:

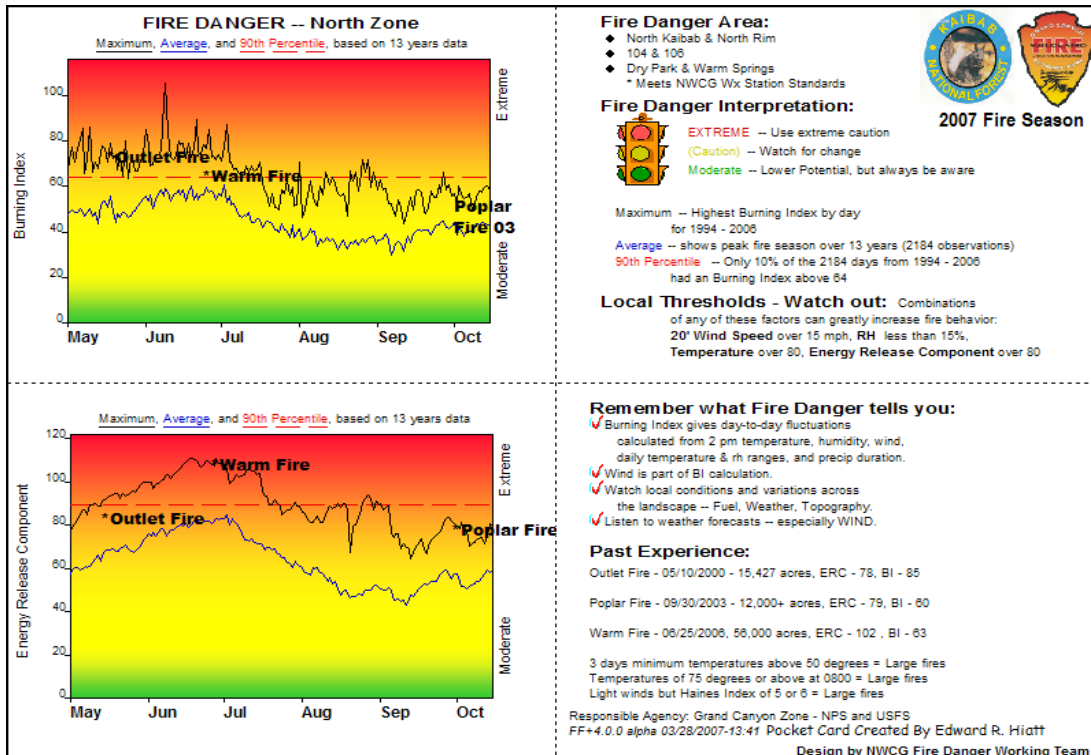
<http://www.fs.fed.gov/gov/pubs/indexcard/indexcard.html>

Information presented in this poster is from the following publications:

Reclamation, Part IV, 1995. Applications of the fire danger potential and firefighter safety. In proceedings: 1<sup>st</sup> Wildland Fire Safety Summit, Wenatchee, Washington, October 1995.

International Association of Wildland Fire, Seattle, Washington.

Exhibit 6



**Exhibit 7 - North Zone Pocket Card dual indices example**

## D. Fire-Danger Based Decisions

Information provided by the use of this document is used to make determinations/decisions on the following:

### 1. Daily Preparedness Levels

Kaibab NF Staffing Levels are based on current NFMAS funding, therefore daily adjustments of staffing levels based on the staffing level index outputs from the NFDRS does not occur.

### 2. Restrictions/Closures

### 3. Severity Requests

## V. Operational Procedures

### A. Weather Station Network

To see a map of the weather station network refer to Exhibit 3. This map shows all of the weather stations in the area. In addition, two portable weather stations are available for prescribed burning and wildland fire use. If there are areas with weather station needs they will also be listed.

### B. WIMS Management (To include station catalogs)

The Williams Interagency Dispatch Center will be responsible for station catalog maintenance for FDRA stations. Dispatchers will enter observations daily as scheduled. They will monitor for accuracy and inform personnel responsible for station maintenance when it appears that a station or sensor is not functioning properly. The Center or Assistant Center Manager will ensure that stations are greened up, cured, and frozen at the proper times. Every three years the Technical Specialist will analyze data to update station catalog breakpoints whenever the breakpoints are adjusted.

### C. RAWS Station Maintenance and Quality Assurance

RAWS will be maintained according to National Standards. The Center Manager for the Williams Interagency Dispatch Center will be responsible for tracking the annual station maintenance. All field maintenance should be completed by April 1 or as soon as access permits. Each station has a Point of Contact (POC) (Exhibit 8) with the responsibilities of carrying out the yearly station maintenance and to fix any problems that arise during the season. Minimum qualifications for a first responder is to have attended a RAWS station maintenance course. The Center Manager will keep the station's Meta data in ASCADS up-to-date and monitor the Watch Dog report from ASCADS for all stations.

Station name and responsible agency	Station #	Latitude & Longitude	Point of Contact
Dry Park - KNF	020212	36 45:00 112 24:00	Edward Hiatt
Warm Springs - KNF	020216	36 42:00 112 13:48	Edward Hiatt
Lindbergh Hill - GCP	020220	36 17:08 112 04:43	Edward Hiatt
Bright Angel - GCP	020211	36 12:00 112 04:00	Edward Hiatt
Tusayan - KNF	020207	35 59:24 112 07:12	Holly Kleindienst
Greenbase - KNF	020284	35 27:42 112 05:97	Holly Kleindienst
Kaibab Micro #1 NR- KNP	020281	Contact POC for location.	Edward Hiatt
Kaibab Micro #2 SR - KNF	020282	Contact First POC for location.	Holly Kleindienst

**Exhibit 8**

## D. Daily Fire-Danger Rating Processes

The Williams Interagency Dispatch Center is responsible for the daily monitoring and editing of all weather station and site inputs and the fire-danger outputs for the NFDRS. This information is to be disseminated to the field during the morning and afternoon fire weather forecast package. This process includes:

1. 1000 - Read over the radio today's fire weather forecast and forecasted fire-danger indices for the day.
2. 1300 - Edit in WIMS the State of the Weather (SOW) and measured live woody fuel moisture values as necessary. This will be accomplished no later than 1330 to assure that the National Weather Service has access to the 1300 hour observations in order to make a forecast for the next day's indices. SOW will be acquired from personnel within each zone.
3. Review all other inputs from station sensors for accuracy and to assure that no station observations are missing. Fix all missing or inaccurate data in WIMS as soon as possible.
4. Review all outputs from WIMS for accuracy.
5. 1630 – Read over the radio the afternoon fire weather forecast and the forecasted fire-danger indices for the next day.
6. Review the fire-danger rating forecasts posted on the South West Area Wildland Fire Operations page to insure accuracy.

Accuracy and storage of the daily weather data is critical for reliable outputs and future analysis. Training for persons responsible for inputting and editing weather observations and station maintenance are essential elements to maintain high-quality data going into the NFDRS calculations. Personnel responsible for these edits must have attended or edits reviewed by someone who has attended the S-491, National Fire Danger Rating System training.

## E. Seasonal Fire-Danger Rating Processes

1. The Center Manager is responsible for the seasonal editing of green-up, curing, and freeze dates.
2. The Center Manager is responsible for adjusting all start-up values for 1000-hr and 100-hr time lag fuels, live herbaceous and live woody fuel moisture values at least 6 weeks before the start of the official fire season. The WIMS default start-up values based on climate class are acceptable if measured values are not available (refer to SWA Fuel Sampling protocol).
3. The technical specialist's are responsible for reviewing and updating the Zone Pocket Cards and Poster Boards before the start of the fire season. Pocket cards should be updated to the SWCC web page along with the Poster Boards.
4. The technical specialist is responsible for assessing seasonal severity for potential severity funding requests – see protocol for severity request from Kaibab NF Fire Management Plan.
5. The Center Manager is responsible for posting and updating ERC/ 1000-hr twice a week (**Monday and Friday**) during the fire season.



## **VI. Program Needs**

### **A. New weather station sites and hardware needs; installation priorities**

All stations are in working order at this time. Continued annual maintenance will be the primary issue.

With the exception of Greenbase, all stations need to be reevaluated as to their location for better wind monitoring.

Greenbase RAWS needs a permanent base.

Tusayan RAWS should be relocated to an area near the Tusayan airport.

### **B. Computer Equipment Needs**

There are no computer needs at this time.

### **C. NFDRS Training Needs**

All dispatchers and Field Operations Managers need to attend S-491 course. Field Operations Managers should attend the Advanced National Fire Danger Rating course. Field personnel will be trained at the annual fire refreshers on the use of the pocket cards and given a basic understanding of NFDRS.

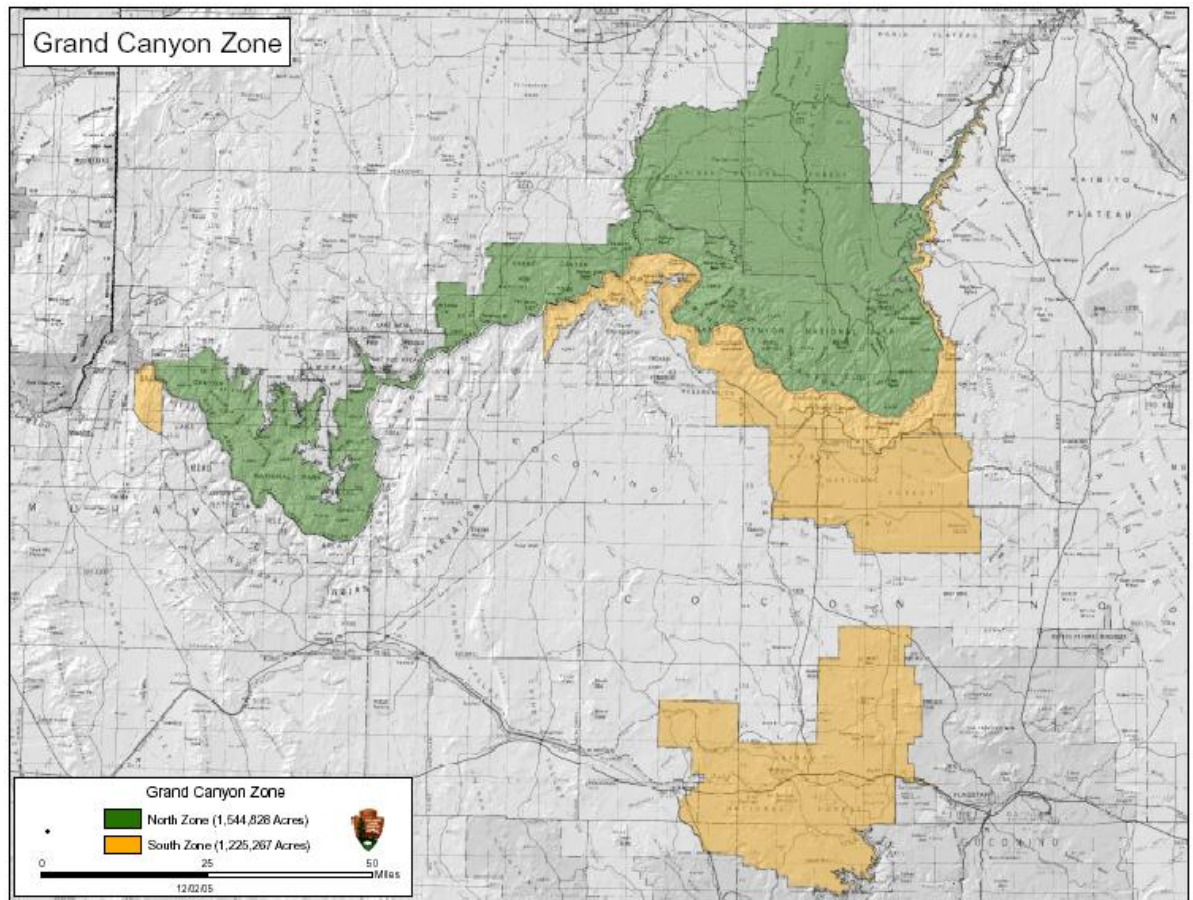
## VII. Appendices

### Appendix 1: User/Group Communications

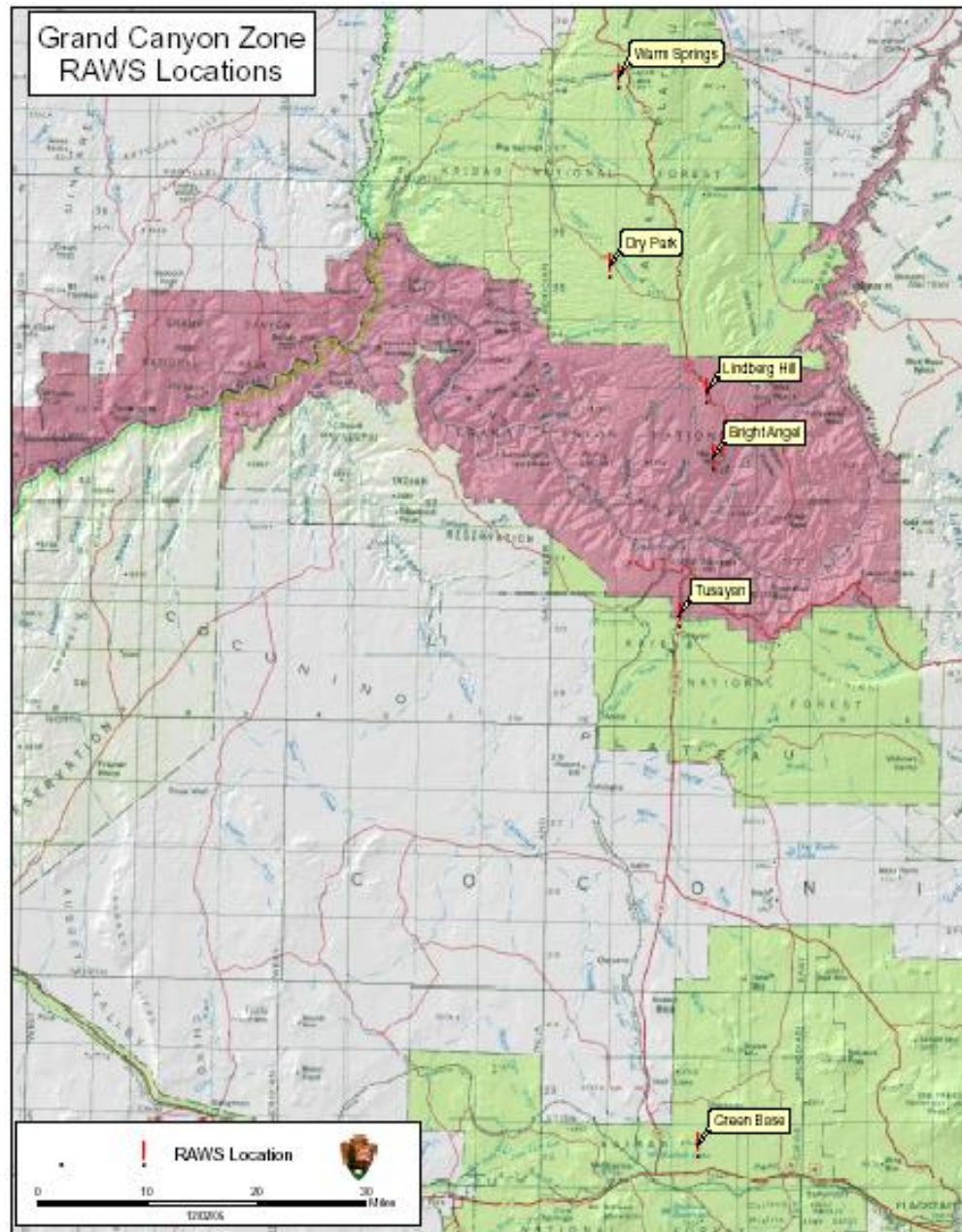
USER/GROUP COMMUNICATIONS					
Target Group	Common Decisions	Degree of Control	Ability to React	Potential Impacts	NFDRS Outputs
<b>Agency Personnel</b> <ul style="list-style-type: none"> <li>• Suppression personnel</li> <li>• Suppression Contractors</li> <li>• CWN</li> <li>• Prevention</li> <li>• Detection</li> <li>• Other agency Personnel</li> </ul>	<ul style="list-style-type: none"> <li>• Staff / no Staff</li> <li>• Preparedness Levels</li> <li>• Pre-positioning</li> <li>• Staff / not staff fires</li> <li>• Burn / no Burn</li> </ul>	<ul style="list-style-type: none"> <li>• Generally High</li> </ul>	<ul style="list-style-type: none"> <li>• High</li> <li>• Communicate               <ul style="list-style-type: none"> <li>➢ Face</li> <li>➢ Phone</li> <li>➢ Radio</li> <li>➢ Internet</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Effective Suppression</li> </ul>	BI/ERC
<b>Industry</b> <ul style="list-style-type: none"> <li>• Logging</li> <li>• Outfitter</li> <li>• Guides</li> <li>• Road Construction</li> <li>• Firewood Cutters</li> <li>• Misc. Products</li> </ul>	<ul style="list-style-type: none"> <li>• Hoot owl</li> <li>• Closures</li> <li>• Restrictions               <ul style="list-style-type: none"> <li>➢ Smoking</li> <li>➢ Campfires</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Good/Poor</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate</li> <li>• Communicate               <ul style="list-style-type: none"> <li>➢ Face</li> <li>➢ Radio/TV</li> <li>➢ Phone</li> <li>➢ Letters</li> <li>➢ FAX</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Large Fire Risk</li> <li>• Financial</li> <li>• Emotional</li> <li>• Potential Claims</li> </ul>	ERC
<b>General Public</b> <ul style="list-style-type: none"> <li>• Hunters</li> <li>• Campers</li> <li>• ORV</li> <li>• Seasonal Residence</li> <li>• Firewood</li> </ul>	<ul style="list-style-type: none"> <li>• Campfires yes/no</li> <li>• Closures</li> <li>• Restrictions               <ul style="list-style-type: none"> <li>➢ Smoking</li> <li>➢ vehicles</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Low</li> </ul>	<ul style="list-style-type: none"> <li>• Low</li> <li>• Communicate               <ul style="list-style-type: none"> <li>➢ Newspaper</li> <li>➢ Radio</li> <li>➢ Warning Signs</li> <li>➢ 1-5 days</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>➢ Proportional to the degree of restrictions</li> <li>➢ Financial</li> <li>➢ Loss of Credibility</li> </ul>	ERC

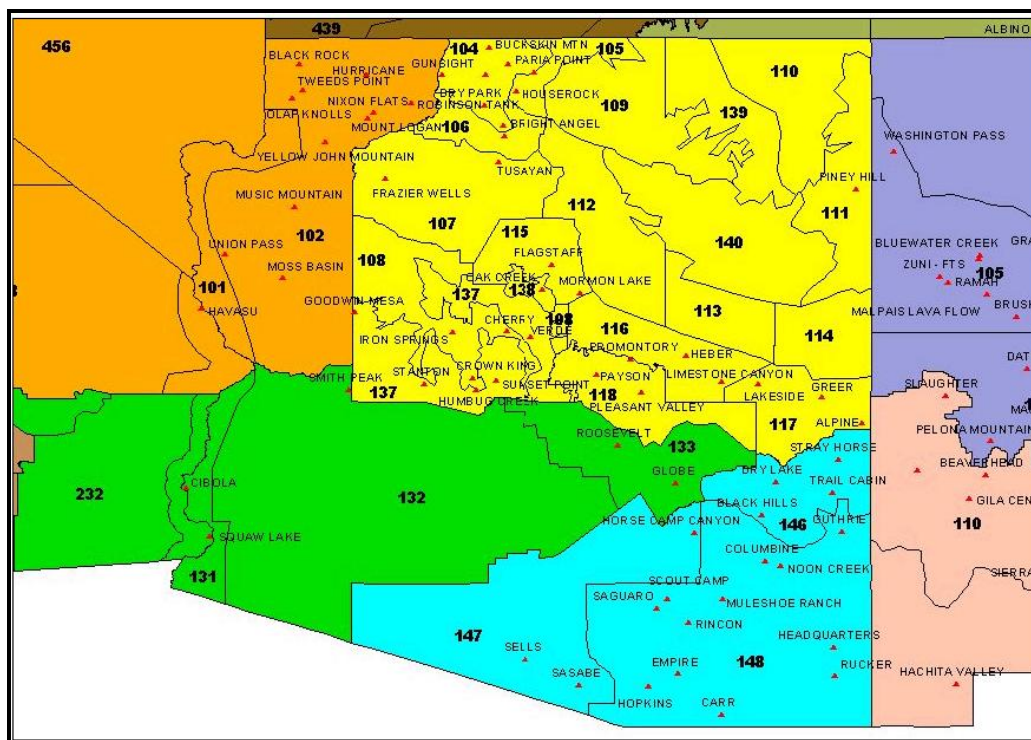
Fire danger outputs are used to support a variety of decisions. These decisions are intended for different groups of people. Our ability to communicate with these groups and their response times depends on the group. ERC and BI are the NFDRS outputs appropriate to guide decisions affecting these groups depending on the decisions being made.

## Appendix 2: Fire Danger Zone Map



### Appendix 3: Station Location Map





#### Appendix 4: Fire Danger Zones by Fire Weather Forecast Office